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# Jointed Obstetric Forceps

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## Jointed Obstetric Forceps.

CONQUEST, HAMILTON, DAVIS, ETC.

By ALBAN DORAN, F.R.C.S.

A PROMINENT feature in the history of the evolution of the obstetric forceps is the adoption for diverse objects, and the ultimate rejection, of joints in the blades and handles. The lock, which must be distinguished from these joints, has undergone relatively few modifications all well known to the student of obstetrics.

Jointed forceps may be classified as follows:—

1. Forceps with handles jointed for convenient packing.
2. Forceps jointed to allow of the application of blades of different sizes.
3. Forceps with blades jointed to allow of the advantages of asymmetry.
4. Forceps with handles constructed so that the instrument may be used as a “long ” or a “short forceps.”
5. Forceps jointed to render easy the application of blades to the foetal head.
6. Forceps with one blade jointed near its extremity for a special purpose.

This classification is empirical, I admit, but convenient for the present purpose. It is based rather on the mechanism of the instruments than on the object of the operator. After briefly reviewing the first four classes, I will dwell at greater length on the fifth, which is well represented in the Loan Collection in the Museum of the Royal College of Surgeons.

### *I. Handles jointed for convenient packing.*

Freake, Surgeon to St. Bartholomew's Hospital, appears to be the first man who ever invented or adopted a forceps with jointed handles. Nothing is known about his instrument, save what can be gleaned from a drawing in Giffard's *Cases in Midwifery* (1733), edited by Hody. A plate represents Giffard's forceps or “extractor,”

and also "*The Extractor as improved by Mr. Freake, Surgeon to St. Bartholomew's Hospital.*" We reproduce it (Fig. 1 to 3) with the notes appended to the drawing. Nothing more is said about it in Giffard's *Midwifry*, and Freake himself never figured or described it. We do not know if it was his own design and if he found it satisfactory. It is not clear whether Hoady meant that Freake's forceps was an improvement on that obstetric instrument in general, or on Giffard's in particular. Mulder, in his *Historia Forcipum et Vectium Obstetriciorum* (p. 20) who quotes Giffard's book and reproduces the drawings of both instruments, observes: "Manubria tandem Extractoris FREKEI ad Cochlearia sunt plicatilia," and thus he is the first standard writer to turn attention to the jointed handle. Freake's lock is simple, being of the English type introduced by Chapman after he lost his screw pivot at a labour and found that he could get on without it. There is a catch on the inner side of each blade, as in Giffard's forceps. The blades appear more solid than Chapman's and Giffard's, but, like them, are fenestrated. the handles turn out at their free ends in French fashion, Chapman's and Giffard's turning inwards. Lastly, there is "the flap that shuts down and covers a sharp crotchet." This contrivance was imitated in a modified Grégoire's forceps by a forgotten designer.<sup>1</sup>

Other obstetricians devised forceps with jointed handles made for convenience in packing.<sup>2</sup> Matthias Saxtorph, of Copenhagen, introduced his forceps in 1791. "Istud autem haecce Forceps habet peculiare, quod Manubria certo modo sint plicatilia" (Mulder, *loc. cit.*, p. 82), his son, Sylvester Saxtorph, and later Danish obstetricians, continued to use it; and in 1866 a recently devised forceps, highly finished, was presented by Levy, of Copenhagen, to the Obstetrical Society. The handles folded up on the blades after Saxtorph's method. It is now on view in the Loan Collection.

Several dealers, such as Charrière (Witkowski, *Arsenal Obstétrical*, Figs. 526—530) more recently constructed forceps with handles which folded up outwards against the blades, as in Saxtorph's, for convenience during transport. They must not be confounded with the Brulatour-Pajot type of forceps presently to be described.

Mulder (*Historia Forcipum*, p. 85 and pl. vii, Figs. 20-29) figures and describes a rather clumsy and complicated forceps of the French type invented by Dubois, of Paris. The handles bore very stout wooden covers, much bigger than those so familiar in old British forceps, and they could be unscrewed so as to lay bare the metal

1. See "A Demonstration of some Eighteenth Century Forceps," *Proc. Royal Soc. Med.*, vol. vi, Sect. History of Medicine, p. 54.

2. "Mutationis illius scopus est, ut Forceps in marsupio contineri et minori molestia sacco recondi posset." Mulder, *loc. cit.*, p. 82, speaking of Saxtorph's instrument.



part of the handles which bore hooks. This instrument, however, does not strictly come under any class of jointed forceps.

Some forceps of the Hamilton type (see Fig. 7) really, as will be explained, come under this class.

## II. *Forceps jointed for Blades of Different Sizes.*

The French obstetricians were the first to make jointed forceps for the purpose of allowing blades of different sizes to be fitted on the handles. Brulatour, of Bordeaux, introduced, in 1817, a highly finished instrument where the bases of the blades dovetailed into the upper portions. It is figured and described in Tarnier and Budin's *Traité des accouchements* (1901), vol. iv, p. 208 and Fig. 37. Pajot's forceps, of which a sample is included in the Loan Collection, is the best known form of instrument constructed for blades of different sizes. The blades dovetail into each limb of the forceps above the lock, as in Brulatour's, but are secured by the special contrivance known as "Péan's aseptic joint." A circular pit is drilled out of the blade, at the bottom of which is a straight slot running vertically. From the base of the blade on to which the movable part is to be fitted, there projects a T-shaped piece of metal, the cross-bar of the T running transversely. The cross-bar is passed through the slot in the movable part, which is then rotated inwards towards the opposite blade, closing the joint; if it is not passed completely through the slot the vertical part of the T-piece is liable to be bent, or even wrenched from its bearing. Pajot's *forceps brisé* or *forceps à branches désarticulées* soon grew popular in France, and makers as well as obstetricians, caused "Péan's joint" to be applied to many forceps of different patterns.<sup>1</sup>

## III. *Blades jointed to allow of the Advantages of Asymmetry.*

Carof, of Brest, an advocate, like Radford and David Davis, of asymmetrical forceps, contrived a curious instrument. The lock bore a ring on each side, and either blade, when fitted into its ring, could be fixed with its convexity at the desired angle. Tarnier and Budin figure and describe this forceps (*loc. cit.*, p. 207). Stout metal handles of the French type might be screwed on below the lock, an arrangement not figured in the work just quoted, but shown in Witkowski's *Arsenal Obstétrical*, Figs. 588, 590, Carof's forceps as given in Tarnier and Budin's text-book, following in the *Arsenal* as Figs. 591, 592.

## IV. *Handles made so that the Forceps might be "Long" or "Short."*

In an instrument constructed by Campbell, of Paris, the upper and inner or metal part of the handles slid along a groove in the outer wooden portion. Each metal part could be fixed by means of a

1. Charpentier, *Traité pratique des accouchements* (1890), p. 683.

screw at any desired point (Witkowski, *loc. cit.*, Figs. 585-6). Thus the instrument could serve as a long forceps, a short forceps, or an asymmetrical forceps of the Radford-Davis type.

#### V. *Forceps jointed to facilitate Application of Blades to Fœtal Head.*

Jens Bing, of Copenhagen, who died in 1754, invented a jointed forceps described in 1750 by his pupil, Janck. The blades were non-fenestrated, and together with the lock, were separate from the handles. They were adjusted, unlocked, to the fœtal head and then fixed at the lock (which was of the scissors type) by a screw. Lastly, the handles, which were of great length, were fitted on to the blades below the lock. Janck states that Bing's avowed object was not so much the easy application of the blades as the sparing of the feelings of the patient. Women complained that when the long forceps with long handles was applied, they had to expose themselves unnecessarily. Levret,<sup>1</sup> in the course of a long and unfavourable criticism of Janck's arguments in favour of the "*Forceps de Bingius*," denies to Bing's forceps any such advantage. "Or, les *Forceps Anglois et François* ne demandent, pour leur application, qu'autant d'écartement des cuisses, que la nécessité de la chose même en exige, tant dans les sujets gras, que dans les sujets maigres; ainsi je ne vois pas assez comment la pudeur d'une Femme en travail, qui s'abandonnant aux soins d'un Accoucheur demande avec empressement son secours, *pourroit en être blessée, et son ame émeurée.*"<sup>1</sup> Yet Conquest, as will be shown, was influenced in part by a similar motive when he constructed the instrument which will presently be described. Bing's forceps was unfavourably received abroad and never came into use, outside his own clinic in Copenhagen, even in Denmark. Ingerslev, in his *Die Geburtszange* (1891), sums up the history of Bing's forceps very well (pp. 51-2), but in Mulder's *Historia Forcipum* the instrument is much better figured and more completely described (Pl. III, 1 to 5 and p. 35). Levy could not find a sample in any Danish museum or maternity; that authority, as has been already stated, continued to use, and indeed contrived a modification of, Saxtorph's forceps in 1866, but that type of jointed forceps (1791) was made for another purpose.

After all, facility of application was the object when Bing contrived his forceps, though the motive was not the same as that which guided later obstetricians. I will now describe Conquest's forceps, where one blade could be applied to the fœtal head free, and afterwards screwed on to the handle, and then speak of Hamilton's and David Davis's instruments where facility of application was attained by a hinge-joint

1. *Suite des Observations sur les causes et les accidens de plusieurs accouchemens laborieux*, 1751, p. 375.

## CONQUEST'S JOINTED FORCEPS.

This rather odd-looking instrument once had its advocates, its principal supporter being, of course, the obstetrician who invented it. The sample in the Loan Collection here represented (Fig. 4) belonged to a box of instruments once the property of the City of London Lying-in Hospital, in use when Conquest was obstetric physician to that institution. It is chiefly distinguished for its wide fenestræ and for the perineal curve on its shanks, whilst the screw arrangement allows of easy application of the upper blade to the foetal head when the patient lies on her left side. After describing the forceps, I will quote Conquest's explanation in full, as it will make clear his intent.

It weighs 1 lb. (454 grams), and measures  $13\frac{1}{2}$  in. (34.29 cm.). The length of the blades is  $7\frac{1}{2}$  in. (19 cm.), their breadth 2 in. (5 cm.). They are broadest in the middle and narrowest at the tip; the greatest breadth across them is 3 in. (7.6 cm.). When closed, the space between their tips is  $\frac{3}{4}$  in. (1.95 cm.). The fenestræ are 5 in. (12.75 cm.) long and  $1\frac{3}{8}$  in. (3.5 cm.) at their broadest or middle portion.

The blades have no pelvic curve and their inner surfaces are quite flat. They have long shanks with a marked perineal curve measuring 2 in. (5 cm.) not taken along the curve. The handles have the usual palm rest; there are no finger rests, but there is a slight shoulder on each side; the lock is of the English type. The limb bearing the left or lower blade is forged in one piece, and its handle is coated with ebony. The handle of the right or upper blade is made entirely of ebony and bears a metal top with a female screw placed there to receive a male screw in the corresponding blade.

Conquest's original account of this forceps, with an illustration, appeared in his article "Practical Remarks on Obstetric Instruments; with Suggestions for the Employment of Belladonna in Some Cases of Protracted Labour," published in 1820 in the *London Medical Repository* (vol. xiii, p. 185).<sup>1</sup> We may leave Conquest to speak for himself.

*"Of the Short Forceps."*

"The *short forceps* which are submitted to the consideration of Accoucheurs, are characterized by the simplicity of their mechanism and their easy adaptation to practical purposes. The fenestræ are so wide as to admit the protuberances of the parietal bones to pass through them, by which two very important objects are secured. We are indebted to Dr. Haighton for this very important improvement in the short forceps; and this acknowledgment affords me peculiar pleasure because it is impossible to mention the name of

1. The same article contains Conquest's original description of his craniotomy forceps; he admits that the blades are constructed after David Davis's pattern.



that truly respectable man without expressing sentiments of the highest respect for his character.<sup>1</sup> But it will be perceived that the forceps in the appended engraving<sup>2</sup> have much narrower shoulders and are less in all their dimensions (except in their length) than those known as Dr. Haighton's."

I have figured and described Haighton's forceps in "A Demonstration of Some Eighteenth Century Forceps" (*Proc. Royal Soc. Med.*, 1913, vol. vi, Section History of Medicine, p. 54). Conquest proceeds to explain how the wide fenestræ in his forceps allow the prominences of the parietal bones to protrude through the blades. Thus bulk is diminished and there is less risk of damage to the soft parts. Then he explains the advantages of the perineal curve<sup>3</sup> on the shanks at the handles.

"The *last*, although very far from the *least*, peculiarity in these forceps, to which reference will be made, is the construction of the handle of the blade, which is usually applied last and uppermost.

"It is only necessary to appeal to any one who has introduced forceps, with their convex surfaces applied to the sides of the pelvis, the ears of the child being in their most natural situation, or from side to side, and such a one will at once acknowledge that extreme difficulty often presents itself to the introduction of the upper blade, in consequence of the bed and mattress below preventing that depression of the handle which is essential to the elevation of the point of the blade, to carry it over the vertex. Indeed the accomplishment of this object is almost impracticable, without changing the position of the woman, or introducing the blade in the hollow of the sacrum and afterwards bringing it over the cheek. But there is a decided objection to either of these alternatives, because women, during labour, always attach importance to the most trifling departure from the ordinary mode of proceeding, so that the mere proposal of turning them on their backs (which, by the by, is a disgusting and indelicate position, because the woman must stare her accoucheur in the face) or even the act of bringing the nates over the edge of the bed, usually excites considerable apprehension; otherwise I am aware that either of these changes would meet the difficulty"(!)

1. It is pleasing to read of a man in our department of the profession so honoured by his pupils and colleagues. His nephew, Blundell, spoke of him as "a man to whom I owe everything that is good both in precept and example" (*Principles and Practice of Obstetricy*, 1834, p. 520).

2. Similar to fig. 4 in this article.

3. Robert Wallace Johnson, it is well known, invented the perineal curve, and made his invention public in 1769. Thomas Young's forceps (1784) also had a perineal curve. It was about one-quarter of an inch longer than Johnson's, which measured 11 in. (28 cm.). Samples of this instrument in museums have apparently been catalogued as "Johnson's Forceps" more than once. Young was an eminent man, Professor of Midwifery at Edinburgh 1756—1780, and conjoint professor for three years later with Alexander Hamilton.



“With respect to the other alternative, or the introduction of the upper blade by the circuitous course of the sacrum. This expedient is often impracticable, and always difficult, because the concavity of this bone may be so completely filled up with the head of the child, so as not to allow of the requisite movement of the instrument, without the employment of an injudicious degree of power. Accoucheurs, alive to this circumstance, have long since had their levers made with reflecting or movable handles; and it is to the latter expedient that I am indebted for the suggestion which led to the simple contrivance of a movable handle, by a screw, which is so clearly exhibited in the engraving; and there can be now no difficulty in introducing the upper blade of the short forceps directly over the vertex, without changing the position of the patient. After the blade is fixed, of course the handle is to be screwed on, and the instrument used as any other.”

“Such are the forceps to which is solicited the candid attention of every medical man who is anxious to practise midwifery with pleasure to himself, and whose solicitude for the welfare of his patients prompts him dispassionately to examine every proposal which may promise to advance so desirable an object.”

After writing about the craniotomy forceps, Conquest concludes his article with a few paragraphs headed “*Of the Long Forceps.*” It was still distrusted and unpopular, but Conquest had already saved three children and a colleague three more, all of whom had been condemned to be opened. But he does not state whether he had a special long forceps constructed after the design of his short instrument. The instrument here figured (Fig. 4), however, bears all the peculiar features of Conquest’s short forceps except that it is “medium.” Its measurements are given above; Conquest makes out those of his short forceps to be—length, 11 in. (28 cm.); length of blades, 5 in. (12·7 cm.) exclusive of the curve; greatest width  $2\frac{1}{8}$  in. (5·4 cm.), where the fenestræ are  $1\frac{1}{2}$  in. (3·8 cm.) wide. The widest part between the opposite blades “ought not to measure more than two inches and a half or five-eighths (6·35 to 6·6 cm.).” The handles are  $4\frac{1}{4}$  in. (10·7 cm.); each shank measures 2 in. (5·08 cm.).<sup>1</sup>

Conquest’s ideas read strangely. As anæsthetics have long been in use and patients are much less particular about lying in one position than they were a hundred years ago, this type of jointed forceps has long been superfluous.

#### HAMILTON’S FORCEPS.

The Loan Collection includes one sample of this jointed forceps (Fig. 5) where the joint is on the handle of the right or upper blade. This handle, we must bear in mind, is on the left of its fellow, since the blades cross as usual at the lock, which is of the “English” or

1. I have added the measurements in centimetres.

Chapman-Smellie type. The handle opens outwards. This joint is characteristic of Hamilton's forceps, but it will be shown that in some samples the joint is on the handle of the left blade, whilst in others it opens backwards instead of outwards.

The weight of this instrument is  $12\frac{1}{2}$  oz. (354 grams); its length 11 in. (28 cm.); the length of the blades  $6\frac{1}{2}$  in. (16.5 cm.); their breadth  $1\frac{1}{2}$  in. (3.8 cm.); the blades are broadest near the tip, the greatest breadth being  $2\frac{3}{4}$  in. (7 cm.). The space between the extremities of the closed blades is  $\frac{1}{2}$  in. (1.27 cm.). The length of the fenestræ is  $4\frac{3}{4}$  in. (12.1 cm.), their greatest breadth 1 in. (2.5 cm.).

The blades are stout and have a strong pelvic curve marked at the free ends, their inner surfaces are plane. They have no distinct shanks. The fenestræ are relatively narrow and are rounded at their lower extremity to allow of the application of tapes. Both handles are lined externally with smooth wood. The lock is of the English type with a clip on each blade as in Smellie's and most later British forceps, and immediately below it the handle of the right blade bears a hinge so that it can open outwards.

This forceps, known nearly thirty years before Conquest's, was used by Dr. James Hamilton junior,<sup>1</sup> the son of Dr. Alexander Hamilton, both in their day Professors of Obstetrics in the University of Edinburgh. It is not clear whether the father or the son was the actual inventor of the instrument. There have, I understand, been errors about references to the original descriptive notice of the forceps, but working together with Dr. R. W. Johnstone, of Edinburgh, I have succeeded in finding it, as a footnote to an article by Dr. J. Hamilton in Andrew Duncan's *Medical Commentaries for the Year MDCCXCIII*, Decade Second, vol. viii, p. 405. The article is called "Observations on the Instrument employed in the Practice of Midwifery, commonly called Lowder's Lever."

I will reproduce the footnote in full:—

"It is not consistent with my views in this Essay, to describe minutely the form of the Forceps. Those which I use are nearly of the same shape as those of Dr. Wallace Johnston. The length of the instrument is 11 inches; that of each handle  $4\frac{1}{2}$  inches. If a straight line be drawn through the centre of the plane surface of one handle, and be produced to the extremity of the instrument (which forms the axis of the handles when both are joined), the convex edge of the blade, at the greatest distance from this line, is distant

1. So-called to distinguish him from Dr. James Hamilton, a well-known physician in the days of his obstetrical namesakes, but not a relative. An instructive sketch of the Professorships of Alexander and James Hamilton, Junr., will be found in Sir A. Russell Simpson's "History of the Chair of Midwifery in the University of Edinburgh," *Edin. Med. Journ.*, Dec. 1882. Professor Whitridge Williams informs me that Alexander Hamilton's text-books were once widely read in the United States.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 5.

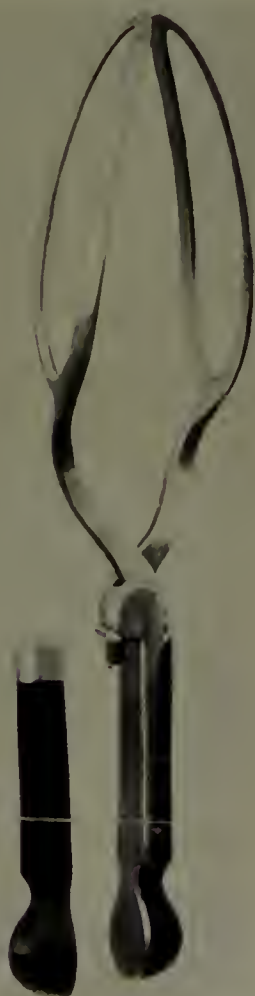


Fig. 4.





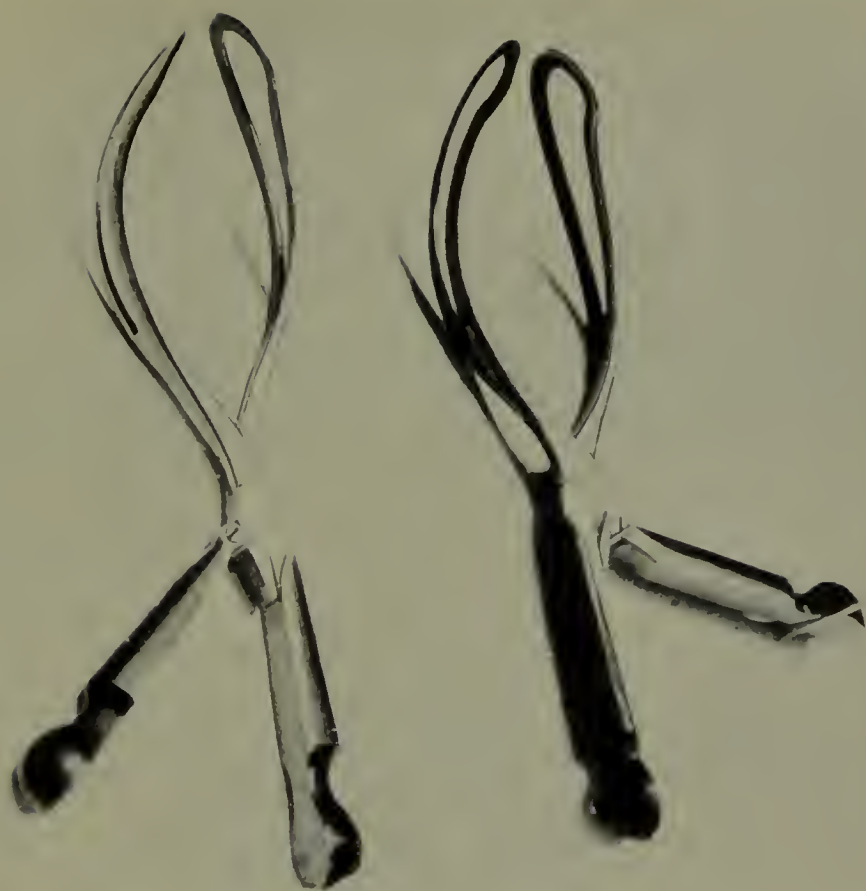


Fig. 6.

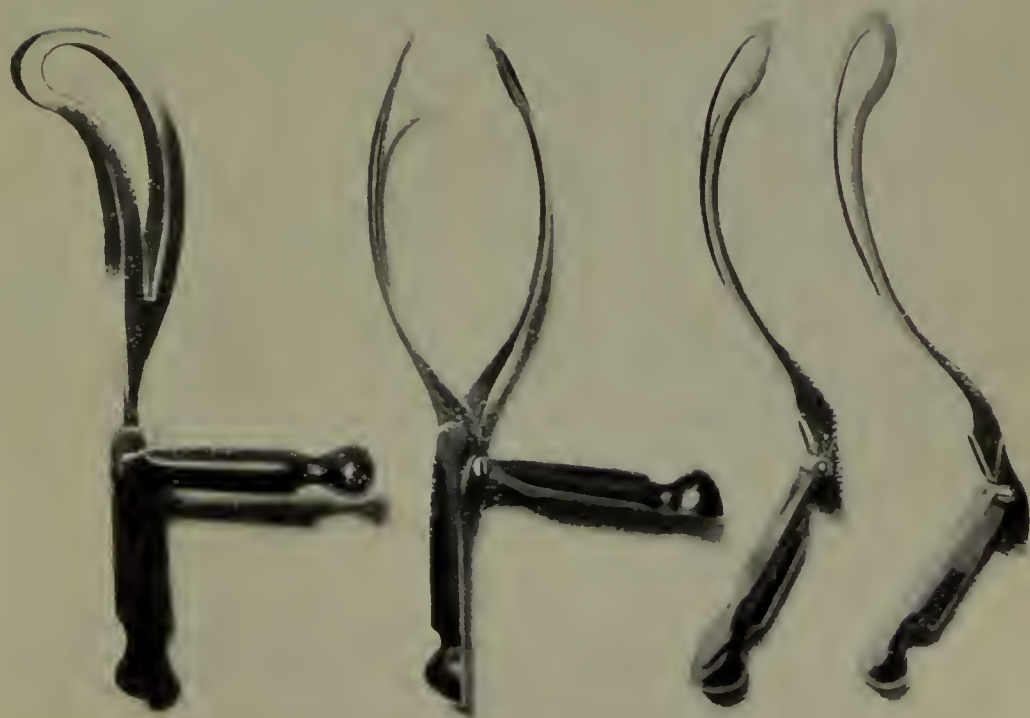


Fig. 7.



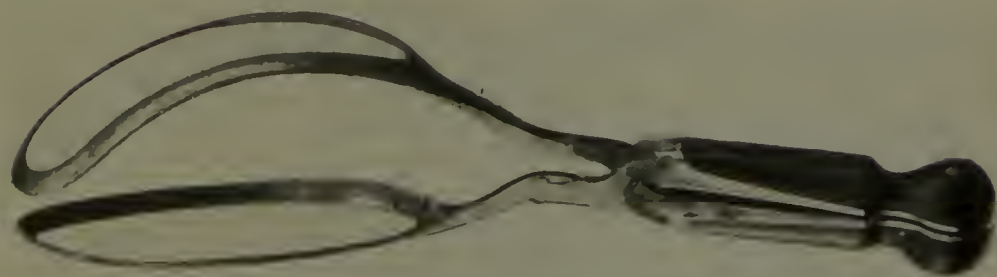


Fig. 8.



Fig. 9.



Fig. 10.





$1\frac{3}{8}$  inches; and the extreme distance of the point, on the opposite edge, is  $\frac{13}{16}$ ths of an inch. When both blades are joined, their greatest width is  $2\frac{3}{4}$  inches. The right-hand blade has a hinge between the handle and blade, by which it is easily introduced, while the patient lies on the left side."

This footnote, as its first sentence indicates, is appended to some observations on forceps in general. In the succeeding paragraph in the text Hamilton speaks of cases where "the ordinary forceps are inapplicable," and proceeds to say that "a long pair of forceps has been recommended," but speaks with disfavour of that instrument. In measurements the College sample does not entirely agree with Hamilton's original report, being longer, but, as will be shown, this instrument was frequently modified. The last sentence in the original report explains simply and clearly the object of the hinge. Hamilton says nothing more about the matter, yet modern collections contain several important modifications of the instrument known by his name.

Hamilton's forceps are familiar objects in museums. At the meeting of the International Medical Congress in August 1913 samples from Edinburgh, Trinity College, Dublin, and St. Bartholomew's Hospital were exhibited in the museum of the Congress. The remarkable variations were striking.

The Edinburgh collection, the Obstetrical Museum of Sir A. Russell Simpson in the University of Edinburgh, is rich in these modifications of Hamilton's forceps. Dr. R. W. Johnstone has kindly sent me photographs of these interesting instruments, which are here reproduced. The hinge joint on one handle, close to the lock, is common to them all, and the blades are similar. In Fig. 6 two forceps are shown. The joint is in the handle of the left blade in one, whilst it is in the handle of the right blade in the other, as in the sample in the Museum of the College of Surgeons. In Fig. 7 we see one Hamilton's forceps where the hinge is on the handle of the right blade and opens *backwards*. In the next, the hinge is on the same handle but opens *outwards*, the forceps being almost identical with the College specimen, No. 5. Next, in Fig. 7, come two single right limbs of forceps with Hamilton's joint on the handle of the right blade. But the handle bends *inwards* on the joint and each has a special mechanism for keeping the joint fixed. In one a slot is seen on the inner side of the handle a little below the hinge. It lodged a screw which could be fixed into the lower extremity of the blade which overlaps the outer surface of the hinge. In the other there is a pin trigger arrangement which fixed the handle at its lower extremity where a notch can be seen. The trigger runs along the handle and its head may be detected projecting into the tape-groove of the palm-rest. On pulling down the head the blade is liberated and may be folded down on its hinge. These hinges made to bend

the handles inwards, were, we may presume, designed to allow of convenient packing. They could hardly have served for any directly obstetric purpose. Therefore they come rather under the first than the fifth class of jointed forceps.

Dr. R. W. Johnstone is of opinion that the instrument in Fig. 7, with the right blade opening *outwards*, is a Hamilton's forceps of the original type, as it corresponds to the measurements given in the footnote to Hamilton's article quoted above, more closely than any other.

In conclusion, all this evidence gleaned from instruments in several museums, proves that the idea of a hinged handle was popular for a time, at least with its designers. The Hamiltons, or their pupils and instrument makers modified the forceps more than once, for the most laudable purpose, no doubt, of determining by experience which type of hinge might be the most convenient. Further experience showed that the hinge was of doubtful value in any form. We need not dwell on the other peculiarities of the Hamiltons' instrument. It was a short forceps with a pelvic curve.

#### DAVID DAVIS'S SYMMETRICAL BLADED FORCEPS WITH JOINTED RIGHT BLADE.

This instrument (Fig. 8), also known as "David Davis's Forceps with wide fenestræ," is one of the products of Dr. Davis's fertile inventive faculty. It is fully described, with figures of the natural size, in his once famous standard work *Elements of Operative Midwifery; comprising a Description of Certain New and Improved Forceps for Assisting Difficult and Dangerous Labours; illustrated by Plates; with Cautionary Strictures on the Improper Use of Instruments*, published in 1825, pp. 38—41 and 201 and Plates I to V, and in D. Davis's "Principles and Practice of Obstetric Medicine," 1836.

It weighs 12 oz. (340 grams) and measures 1 ft. 0½ in. (31·75 cm.) in length. The blades are 7¾ in. (19·7 cm.) long, and 2½ in. (5·4 cm.) broad, at their broadest point, nearer the base than the free extremity. The greatest breadth across the blades is 3 in. (7·6 cm.), and the distance between their tips when closed is 1¼ in. (3·17 cm.). The fenestræ measure 1½ in. (3·8 cm.) at their widest.

The blades, unlike those in some other types invented by David Davis, are symmetrical. The left blade and handle are forged in one piece; the right blade, as will be explained, is jointed and the lock is of the English type.

The handles are coated with ebony and bear the usual palm rest, but neither a finger rest nor a shoulder. The shanks, about 1 inch (2·5 cm.) long diverge at an angle of 45°; the joint lies in the right shank. This space between the shanks, originally appearing in Evans's (of Oswestry) and Aitken's forceps has ultimately been

associated with the name of Simpson. "The blades," says Davis, "are much broader than those of any other forceps with the exception of Haighton's." We have seen that Conquest adopted Haighton's broad fenestræ. The blades are greatly hollowed out anteriorly so as "to lie in close contact with every part of the child's head to which they are applied and to admit of the reception and firm purchase of extensive portions of its lateral parietes." The blades on their inner surface slope towards the border of the fenestræ so as to take up less space in the pelvis. The pelvic curve is marked. There is no perineal curve.

The circular joint in the shank of the right blade was fitted on so as to allow it to be placed at any angle. It could be fixed or released at will by means of a spring catch. In the sample in the Loan Collection this spring catch had been partly destroyed by rust, and the blade was broken off during an attempt to bend it, and it has been repaired without restoration of the joint action. The joint was placed so that the blade could be bent outwards, in the contrary direction to a folding vectis, and David Davis believed that this expedient "may add occasionally to the facility of introducing the right-hand branch."

Thus the joint was designed for much the same purpose as Conquest's screw handle.

Murphy, who succeeded David Davis at University College, figured and described this instrument in his *Lectures on the Principles and Practice of Midwifery*, 1862, and declared that "it was quite unsuited for practitioners and obstetricians unless of long experience."

#### VI. *Forceps with One Blade jointed near its free end for a special purpose.*

A remarkable instrument, the sole example of its kind, I understand, may conveniently be placed at the end of this rather long series of obstetrical instruments.

#### DAVID DAVIS'S ASYMMETRICAL LONG FORCEPS FOR CASES OF ARREST OF FŒTAL HEAD IN TRANSVERSE POSITION (*Long Blade jointed near free end*).

David Davis devised several other patterns of obstetric forceps to meet certain contingencies (Figs. 9 and 10). The most remarkable of these instruments must be noted here, as one blade was jointed. The jointing was for a unique purpose, not for convenience in packing, as in Freke's and Saxtorph's forceps, nor for allowing of the application of blades of different side as in Pajot's, nor for facilitating the introduction of the upper blade as in Hamilton's, Conquest's, and the symmetrical bladed forceps, of Davis's design,



just described. Nor was the joint placed in the shank or in the upper part of the handle. The blade itself was transversely jointed near the tip to aid in the extraction of the head under the complication named above in the heading. Another peculiarity about this instrument is that there were two long blades, one for use when the face of the fœtus lay to the left and one for use when the face lay to the right.

The sample in the Loan Collection is in good condition. I have cut away part of the leather cover of one long blade in order to show the whole of the mechanism described below.

The forceps as in use, that is to say, with the short blade articulated to one long blade, weighs 1 lb. 4½ oz. (490 grams). The long limb measures 1 ft. 2½ in. (36·8 cm.) in length; its blade is 10 in. (25·4 cm.) long, and 2½ in. (5·4 cm.) at its broadest, near the tip. The short limb is 1 ft. 0½ in. (31·75 cm.) long; its blade measures 7½ in. (19 cm.) in length, and 2 in. (5 cm.) in breadth, the broadest part being almost at the tip. The fenestra of the short blade is 3⅜ in. (8·5 cm.) long and 1¼ in. (3·17 cm.) at its broadest point.

The handles are coated with ebony and bear the usual palm rest; there are no finger rests and only a shallow shoulder made by the metal covering the upper border of the ebony cover. The shanks of the two blades are both nearly 3 in. (7·6 cm. long). The long blade has a marked pelvic curve and is entirely coated with leather. The fenestra is filled in by the apparatus for flexing the upper part of the blade. The short blade has no pelvic curve and is coated with leather which does not cover the fenestra (Fig. 10).

David Davis explains the application of this forceps in his *Elements of Operative Midwifery* (p. 242, *et seq.*, and Pl. X, XI and XII). "I consider," he writes, "the old long forceps as decidedly unsuitable for the relief of cases of arrest of the fœtal head at the superior aperture of the pelvis, under the circumstances of either of its transverse positions. Accordingly, I have to submit to the approbation and cautious trials of the profession a form of modification of a pair of forceps, which may be used under these circumstances with considerable effect; and certainly, if dexterously used, without any risk of doing an injury to the mother. . . . It consists of two counterparts of unequal length as well as of different and unequal powers. The long one is covered with leather and lined with a padding of the softest flannel; a considerable part of its blade being intended to apply firmly to the face of the child. At a distance of about an inch and three-quarters, the blade has a joint in it, admitting of a limited degree of flexion and extension. When this branch of the instrument is carried up to its proper destination, the jointed part of the blade will be found to correspond to the superior portions of the face. The movements of the part of the instrument anterior to the joint are made obedient to the will of the practitioner.



The blade is to be passed up along the left side of the pelvis in the state of full extension. When distinctly felt to have passed over the great convexity of the forehead, and ascertained by examination to be so far properly applied, the anterior part of the blade is to be bent down and applied closely to the face; which is to be effected by moving the nut upwards. This little contrivance is very simple. The anterior portion of the blade is made capable of two degrees of flexion with the other parts at the pleasure of the operator." In the sample here figured there is a screw on the outer side of the shank of the long blade, instead of the sliding nut, otherwise the mechanism for flexing the upper part of the blade is the same. Davis teaches that it is advisable "to produce the greater degree of flexion, which will give to the anterior part of the blade an ample purchase over the child's forehead and face. The shorter branch is then to be passed up along the right side of the pelvis, and applied to the child's occiput, to act both as a fulcrum and an antagonist to the other. The power of this instrument is only partially that of a pair of forceps. There is here no co-equal counter-pressure applied to directly opposite parts of the head. It acts principally as an adductor; the attracting power being applied to a surface nearly opposite to the presenting part of the head. The short blade being applied to the occiput, the two branches of the forceps are then to be mutually adjusted at the lock."

David Davis showed a wonderful reliance on his variations of the obstetric forceps. He continues, after noting a few precautions: "Everything being thus made ready, we then draw down, simultaneously with the parturient contractions of the uterus. . . . As the head is felt to descend into the cavity of the pelvis, the operator should endeavour to carry back the face gradually into the hollow of the sacrum. This latter movement might, however, in some cases preferably be left to be accomplished either by the natural powers or by the subsequent use of the short forceps with blades of unequal length."

These asymmetrical short forceps, as well as several other ingenious modifications are preserved in the Loan Collection. The whole series of David Davis's instruments was presented to the Obstetrical Society by Hall Davis, the son of the inventor.

David Davis's ingenuity produced a formidable armamentarium, and the leather and flannel investment of the blade above described is awful to contemplate. Still this jointed forceps is worth remembering.

Chassagny's forceps (*Méthodes de tractions soutenues*) bore a jointed traction apparatus, but, like axis-traction forceps, cannot be included in any of the six varieties of jointed forceps described above.

As in the case of previous articles on forceps, I must express my thanks to Professor Keith and the President and Council of the Royal

College of Surgeons for permission to add photographs of the instruments in the Loan Collection; to Mr. Barry Hopkins for important instruction on questions of mechanism and identification; and to Mr. Butterworth for taking the photographs.

As I have thought it right to allow the designers to speak for themselves, this communication is in consequence too lengthy to admit of the inclusion of their biographies.

#### ILLUSTRATIONS.

Figs. 1—3.—“The extractor as improved by Mr. Freake, Surgeon to St. Bartholomew’s Hospital.” From Giffard’s *Cases in Midwifry*, 1734. Fig. 1: “The two sides joined.” Figs. 2, 3: “The two sides separated.” Against Fig. 2 is written, in the original sketch, “A Flap that shuts down and covers a sharp crotchet.” The joint in the handle is exposed, slightly bent. Against 3 is written, close to the lower end of the handle, “A blunt crotchet.”

Fig. 4.—Conquest’s forceps. Loan Collection, R.C.S., seen from behind, the right blade being on the observer’s right. The handle of that blade<sup>1</sup> is unscrewed. The shanks bear a perineal curve.

1. N.B.—As the blades of an obstetric forceps cross at the lock, the handle of the right blade lies on the left side of the instrument and *vice versa*.

Fig. 5.—Hamilton’s forceps. Loan Collection, R.C.S.. A short instrument with the pelvic curve. The handle of the right blade is jointed and opens outwards.

Fig. 6.—Hamilton’s forceps in the Obstetrical Collection, Museum of Edinburgh University. Photographed by Dr. R. W. Johnstone. In one the handle of the left blade is jointed and opens outwards, in the other (on the observer’s right) the right blade is similarly jointed, as in Fig. 5.

Fig. 7.—Photographs by Dr. R. W. Johnstone of four similar forceps in the Edinburgh collection. In the first (beginning from the observer’s left) the handle of the right blade is jointed and opens backwards, in the second it opens outwards, as in Fig. 5. The third shows a right limb only; the handle slides down after the removal of a screw(not present) fixed in the slot on the inner side of the handle immediately below the hinge. The fourth, also a right limb, bears a hinge. By pulling down a metal bar, the handle can be bent inwards. The flattened head of the bar is just visible under the upper border of the tape-groove above the palm rest.

Fig. 8.—David Davis’s symmetrical bladed forceps with jointed right blade. The joint lies in the shank of the blade. Loan Collection R.C.S.

Fig. 9.—The long blades of David Davis’s asymmetrical long forceps for cases of arrest of the fœtal head in transverse position. Loan Collection, R.C.S. The outer surface of the blade employed when the face lay to the right has been stripped of its two leather coats and intermediate layer of flannel to display the joint near its upper end and to make clear the mechanism by which that joint can be moved.

Fig. 10.—The same forceps with the long blade articulated to the fenestrated short blade which was applied to the occiput.